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Royal Society of Arts, London

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REPORT

OF THE COMMITTEE OF THE

SOCIETY OF ARTS, &c.

TOGETHER WITH THE

APPROVED COMMUNICATIONS

AND

EVIDENCE UPON THE SAME,

RELATIVE TO THE MODE OF

Preventing the Forgery

OF

BANK NOTES.

Printed by Order of the Society.

LONDON:

1819.

SOLD BY THE HOUSEKEEPER, AT THE SOCIETY'S HOUSE
IN THE ADELPHI;
AND BY ALL BOOKSELLERS.

[*Price Four Shillings.*]

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T. C. Hansard, Printer,
Peterboro' Court,
Fleet Street, London.

REPORT.

THE rapid increase, during the last three or four years, of convictions before the criminal courts for the circulation of Forgeries of the Bank of England Notes, is such as to have made a very serious impression on the public mind.

The increasing reluctance of Juries to visit with the extreme penalty of the law, a crime, for the prevention of which no successful precautions have apparently been taken, and the notorious fact, corroborated by evidence produced at several recent trials, that Forged Notes have passed undetected through the scrutiny of the Bank Inspectors, have attracted general attention.

Under these circumstances, the Members of the Society for the Encouragement of Arts, Manufactures, and Commerce, have thought it neither unworthy of, nor foreign to the objects for which they are associated, to enter upon an investigation for the purpose of ascertaining whether there exist any means, within the compass of the fine and the mechanical arts, not of totally preventing the Forgery of Bank Notes (for that is obviously impossible), but of increasing the difficulty of imitation, and thus of

checking the prevalence of the crime. With this view, early in last March they accepted a communication from Mr. B. Beaumont, one of their members, and appointed a Committee for its investigation. Other plans from various quarters were sent in, and information of no trifling value was obtained by oral testimony, both from the members of the Society and from strangers.

It is evident that the currency of lowest denomination, whether that be metallic coin or promissory paper, must be that which circulates chiefly among the lower classes, and for the payment of small sums. When it is considered, however, that a large proportion of the lower ranks of society are wholly incompetent, from their ignorance, of distinguishing between two specimens of writing-engraving, that bear only a very general resemblance to each other, it cannot be doubted that the difficulty of protecting these from being imposed upon by Forged Notes is very great.

If the chance of detection increases with the increase of the number of hands concerned in producing a Forged Note (which seems to be generally admitted), then, the best way of insuring the integrity of the circulating medium is, to render necessary for its production the concurrence of several arts, and which it is impossible for one individual to possess.

The component parts of a Bank Note are the Ink, the

Paper, and the Characters of whatever kind, whether letters, figures, or vignettes, that are impressed, by means of the ink, on the surface of the paper.

The perfection of Ink, and that which distinguishes the superior from the inferior kinds is, its absolute blackness, without any intermixture of brown. In this respect the Bank of England Note seems to be nearly perfect; and on comparing the genuine with the spurious, a sensible difference may often be observed.

With regard to the Paper, it should unite in a high degree the qualities of thinness and lightness, with opacity and toughness. On this head, no improvements appear to have been suggested in the Committee, and it is well known that bankers' clerks and others who are in the habit of turning over great multitudes of Notes, will, from the feel alone, separate, with remarkable accuracy, the real from the false. To persons, however, through whose hands multitudes of Notes do not pass, slight differences in the texture of the paper are imperceptible.

The water-mark of the Bank of England Note is guarded from imitation by the penalties of the law; and therefore the forger who buys his paper must necessarily imitate the water-mark as well as the engraving and signature. There appears, however, to be no difficulty in producing a passable imitation of this; and a person capable of copying the engraving, would also be perfectly

adequate to the imitation of the water-mark. The employment of striped paper of different colours was suggested by the author of one of the communications, and although this proposal did not meet with the approbation of the Committee, yet it may be possible to introduce such differences in the compass of a Note, not in the thinness of the paper, but in its actual texture, as to compel the forger to make his own paper.

The face of the present Bank of England Note consists of writing-engraving and a vignette, executed in the usual way on copper, and of certain figures and letters impressed by projecting types, like common printing or wood engraving.

Concerning the quality of the writing-engraving, there was some difference in the opinions given before the Committee by professional persons; the greater number considering it of inferior execution, while by some it was regarded as of fair average quality. Concerning the vignette no difference of opinion subsisted, it being universally considered as offering but little difficulty to the forger.

It is self-evident that, in proportion to the talent employed in the original designing and engraving of a Bank Note, will be the difficulty of imitating it; and abundance of evidence was produced by Mr. Warren, Mr. Ashby, Mr. Sylvester, Mr. Finden, and other artists, that those

country Banks that have chosen to go to the expense even of small vignettes well executed, have never as yet been forged upon, and that a forgery on the Plymouth Bank about 25 years ago, was immediately and effectually stopped by the adoption of a good vignette of small size.

There is, however, a natural limit to the employment of superior engraving, arising from its expense, and from the longer time required for its execution.

It is in evidence that the average number of copies taken from each copper plate, does not much exceed 6,000; hence, if the expense of engraving was greatly enhanced, the profit arising from the issue of £.1 notes would entirely cease. If the daily issue of small notes from the Bank of England amounts to 30,000,—and from the evidence produced, there is reason to believe that it exceeds rather than falls short of this number,—there is a daily consumption of five plates, or 1,500 in the year; and there might, perhaps, be some difficulty in finding a sufficient number of superior artists to produce the required quantity of plates.

The possibility of substituting steel for copper, has been suggested as a means of obviating these difficulties.

A specimen of engraving executed on soft steel was produced to the committee by Mr. Warren, and from the concurrent testimony of several witnesses, it appears that

a block or plate of steel may be softened, so as to admit of its being engraved upon and etched, and that the time required by the artist to produce a given effect is not twice that required when copper is made use of. Under such circumstances, the plate, when finished, would be capable of being again hardened, and in that state will afford 20, or perhaps 30 times the number of impressions that copper will. Hence it appears, that all the security attainable by the employment of art of a very high degree, superior even to that which has been found effectual with regard to the country Banks, is within the reach of the Bank of England, and probably without any additional expense. As examples of the precautions against Forgery, adopted by many banking companies in the United States, specimens were presented, by various persons, of Notes, the margins of which were composed of waved and intricate patterns; these were pronounced by the artists present to be scarcely, if at all, imitable by the common process of engraving.

It was represented to the Committee by Mr. Clymer, who stated himself as speaking from his own personal knowledge, gained while he was one of a company in the United States for the manufacture of Bank Notes, that the engraving of the ornamental borders of the American Bank Notes is made on thick plates of soft steel, by means of the turning-engine, and the punches and other methods employed by die engravers. These plates being subsequently hardened, are used to impress cylinders of soft

steel, and these cylinders, when hardened, are used to impress copper-plates, in which the writing, vignettes, &c., are subsequently inserted in the usual way.

Thus, the absolute identity of almost an infinite number of Notes (scarcely imitable by engraving, as far as the ornamental border is concerned) appears to be provided for, requiring also a large and expensive apparatus for their original production, and therefore impossible of acquisition by the forger, unless previously possessed of a considerable capital.

Specimens of engraving by machinery have also been laid before the Society as applicable to the construction of Bank Notes difficult of imitation; and this part of the subject naturally arranges itself under two heads.

Under the first are included all those methods of scroll work, and of rose engine work, which, from their intricacy, set all imitation by manual engraving at defiance. In some of these instruments, the adjustment admits of so much variety, that even allowing the forger to be possessed of a similar engine, the chances against his hitting on the several adjustments requisite to produce any particular pattern, are almost infinite. Specimens of this kind in particular were presented by Mr. Desvignes. It appears by the application of machines of this construction, that great, and probably almost insuperable, difficulties are opposed to the exact imitation of patterns thus produced. But it

may admit of a doubt whether their very intricacy, and the want of any prominent part to impress the attention, would not allow even a general resemblance to pass in the hurry of business.

The second kind of machine engraving differs essentially from that just described, in the perfect uniformity of its work.

It therefore consists of straight or waved or curved lines, placed exactly parallel to, or intersecting each other at regular distances, producing the general effect of a tint of even colour over every part covered by the engraving, and characterised, on minute inspection, by an exactness in the relative situation of the lines wholly unattainable by hand. Specimens laid before the Committee by Mr. Allan and by Mr. Solly, seem to leave little, if any thing, farther to be desired on this head.

Another art, namely, that of typographic printing, has been introduced into an American Note, and is also the subject of a communication by Mr. T. C. Hansard, approved by the Committee, and by the Society.

From the testimony of professional artists, it appears extremely difficult to produce the effect of type printing by common engraving. If, therefore, it be granted that a note composed of type can only adequately be imitated by type, the present forgers must either associate type

makers in their schemes, or learn an entirely new art. The smallest kind of type, called *Diamond*, is so difficult of execution, and so little in demand, that (as appears from the testimony of Mr. Caslon) there are not more than four or five persons in England who can cut the punches for it. By fixing upon an unusual form for the type, in which, for example, the letters shall lean the contrary way to Italic type, and making it penal to execute any such, except for the Bank of England, a great difficulty in the first instance will be opposed to the Forger. It does not appear that the most expert artist can execute more than two punches in a day. Now, it would be easy to combine 1,200 or 1,500 different letters and characters, and forms of letters and characters in one Note, and to repeat each letter and character several times.

It would therefore be necessary that the forger should either be himself a first-rate artist, or should secure the co-operation of such; and that he should employ from two to three years in furnishing himself with materials. That he then should acquire the art of the letter-founder, or expose himself to the additional risk of a second associate in his fraud, in order to obtain from the punches a font of types.

But security in a high degree against Forgery is not the only advantage attending the use of typography; for if with this latter the process of stereotyping be combined, we obtain absolute identity through an infinite number

of impressions, without any necessity of renewing the original punches, combined with all the difference in rapidity of production between letter-press and copper-plate printing.

It appears, therefore, as the result of this Investigation, that there are at least three or four practical methods of constructing Bank Notes, each of which will, in a greater or less degree, prevent the successful competition of the Forger; namely, the highest perfection of design and of engraving, executed on steel,—the adoption of figured borders, like the American Notes,—the union of variety, evenness, and mathematical accuracy, in engine engraving,—and the perfection of type combined with stereotype.

But the employment of any one of the three first of these modes is not in the least incompatible with the combination of any other or of all the three; and this combination is in fact contemplated by the authors of all those communications that have been approved by the Society.

In the same manner analogous combinations of wood engraving, and of works of art cut in the same manner, or struck on metal, are capable of being united with printing type.

Thus means appear to be accessible to the Bank of

England, of rendering the forgery of their notes in a high degree more difficult than at present.

The problem entrusted by the Society to the investigation of this Committee, appears to be resolved, and although it is not in the nature of things that a person who cannot read should be protected from imposition by the most clumsy forgery, yet to all others the security thus offered appears to be so nearly complete, as to invite a fair trial of its practicability.

COMMUNICATIONS.

MR. T. B. BEAUMONT'S COMMUNICATION.

County Fire Office, Southampton Street,
March 4, 1818.

To His Royal Highness the PRESIDENT and the Right Honourable and Honourable the Officers and Members of the Society for the Encouragement of Arts, Manufactures, and Commerce of London.

MAY IT PLEASE YOUR ROYAL HIGHNESS,
MY LORDS, AND GENTLEMEN;

FORGERIES of Bank of England Notes are so frequent, and the consequent loss to the public, and hindrance to commerce, and sacrifice of human lives to the penalties of the law, are so considerable, that I think it high time for persons of intelligence and influence to exert themselves for the prevention of the evils. This, I am well persuaded, is attainable in a very considerable degree, if not wholly so. But, in addressing the Society of Arts, I appeal to a body of gentlemen who are qualified to be the best judges on the subject, and I am desirous that my opinion should be corrected by their's.

I therefore take the liberty to submit an extract from a paper, which, about a year since, I sent to the Bank of England, on the prevention of Forgeries. It is only within these few weeks that I have had an answer from the Bank, and this informs me that similar plans to mine had been received from others, but that none were deemed effectual.

If, however, a succession of persons, who are known as men of science or business, suggest similar means of prevention, the reasonable inference, I submit, is, that opinions so concurring are right.

I have the honour,

&c. &c. &c.

J. T. Barber Beaumont.

Extract from a Paper delivered by J. T. Barber Beaumont, Esq., to the Bank of England.

Forgeries of Bank of England Notes are so frequent, because they are so easy of imitation. They are of inferior workmanship to common engraved shop-bills. An apprentice to a writing engraver of two years standing, by three or four days work, is able to copy a Bank Note plate, so that ordinary judges cannot tell the genuine from the spurious. There are not less than 10,000 persons in this country who are able to engrave successful imitations of Bank of England Notes, and nine-tenths of these are in needy, and many of them in distressed circumstances. It is, therefore, not surprising, if amongst so many who are competent to relieve their necessities by these forgeries, some should be desperate enough to commit them.

Now if, instead of being the common-place work of *inferior writing engravers (who are so numerous)*, Bank Note plates were *master-pieces* of the *best historical engravers (who are so few)*, whose talent is so rarely to be found, the number of persons who would be able to attempt an imitation, with any chance of success, would be very inconsiderable indeed—not ten persons, perhaps, where there are now ten thousand. But these persons, by the legitimate use of their talents, can acquire compe-

tence—they, therefore, are not likely to employ their time, and risk their lives in felonious imitations. Nay, if in the perversity of the human mind, a first rate artist were disposed to turn forger, he could not do it successfully, because, even in the very first rank of historical engravers, one cannot imitate the engraving of another in a work of importance, such as an historical group finished in the best style, without the difference of manner being visible. If, for instance, Sharp were employed to engrave a plate, and Heath or Warren (I hope those gentlemen will pardon the supposition) were disposed to imitate it, they might produce a work of similar beauty and general effect to that of Sharp's, but the difference of manner would be obvious to the commonest observer, and not only would the forgery be instantly detected, but the hand that had done it be immediately identified—for historical engravers recognize each other's handling with as much facility as correspondents recognize each other's handwriting; and with more certainty. It is, therefore, not within the verge of probability to suppose that first-rate artists, enjoying large incomes, would commit a crime, where defeat, detection, and punishment, could not fail to light on them immediately; and as none but first-rate artists could make the attempt, it follows that an end would be put to the commission of the crime.

This view does not rest upon theoretical reasoning. It has been proved to be true in practice. Several Country Bankers have long been aware of the utility of having their notes engraved in a superior manner, in order to increase the difficulty of imitation. They have had their notes engraved in this manner, and have succeeded completely. I might quote several instances of the success which has followed this precaution, but this may suffice: The proprietors of the Plymouth Dock Bank, about 18 years since, were forged upon: they, in consequence, had

a handsome vignette designed, and engraved by an eminent historical engraver. He has engraved several successive plates for them, and they have never been imitated. But the partners, some years since, wishing to have a distinct appearance between their *notes* and *bills*, had a new plate engraved for the latter, with only an *ornamental cypher* instead of the vignette. This was *no sooner issued than it was imitated*, whereupon they immediately discontinued the use of the cypher plate, and adopted the vignette, and *since then* they have had *no forgeries on them*. The artist tells me that he and other historical engravers have engraved vignettes for several Country Bankers, and that he never heard of a Forgery having been ATTEMPTED of any of *their* plates. Thus the feasibility of the system in theory stands confirmed by practical experience. Its effectiveness then in the prevention of Forgeries, I think, cannot admit of a doubt. The only reasonable objection which I can conceive it possible to advance, lies in the seemingly great expense of using *superior historical engravings*, instead of *inferior writing plates*. If, however, I shall prove, that instead of the proposed means involving the Bank in additional expense, it will materially lessen the expenses, at the same time that it will relieve the public from the loss of time occasioned by writing names on the notes, the loss of property incident to their receiving forged notes, and the vexatious proceedings consequent on their being impounded by the Bank, to say nothing here of the temptation to crime, and the sacrifice of lives consequent on the present mode of manufacturing Bank Notes—I think it will be impossible to deem the system which I advocate otherwise than highly useful to the Bank, as well as to the public, and such as ought to be adopted without delay. Now then as to expense.

It is well known that engraving may be done upon softened steel as well as on copper; it is also ascertained.

that when engraved, the steel plates may be hardened to a high degree, without injury, and that, so prepared, they will yield an immense number of impressions without any sensible wearing. I have heard some practical men say, they will bear a million of impressions, others reckon upon a hundred thousand. A plate executed, as I propose, would cost £.30; so that taking the minimum of impressions, viz., 100,000, the expense of using fine historical engravings on steel, would be £.30 for 100,000 impressions.

The present copper plates, I suppose, cost the Bank about £.3 each, and yield about 5,000 impressions; the expense then of using bad writing engravings on copper, is £. 60 for 100,000 impressions, just double the expense of plates on the preventive system. This view only draws into comparison the relative expenses of the opposite description of engravings, but a far more important saving would be produced by superseding the necessity of the expense of criminal prosecutions, and of the attendant corps of spies and informers.

A further effect of this system in preventing forgeries, would be found in all the Notes of one kind for a *long period of years* being taken from *one plate*, whence a person having a genuine Note might compare it with the *minutiæ* of another suspected to be forged, and as it would be impossible even for the artist himself who had engraven an original plate, to follow, in a copy, the length, sweep, depth, and number of the strokes in his original, a detection would be easily made, even by those who knew nothing of the arts.

My preventive of forgeries, then, consists in *combining* the use of the *finest historical engravings* with the use of *plates of extraordinary durability*.

The vignette which I should recommend for the plates of the Bank of England, would occupy not less than one-

third of their whole space. It would be an historical composition—containing not less than three human figures; the figures to be nearly naked, as such subjects put the ability of the artist to the nicest test. The very first-rate talents to be found among the artists of this country ought to be enlisted in this service. Different vignettes ought to be used for the different denominations of Notes, the more effectually to distinguish them. Every successive plate of one denomination should be marked with a successive letter or number, and the date of the year when first issued.

Such is my conviction of the effectiveness of the system which I recommend, that I am willing, at my own expense, to produce such a plate, as I have described, and a hundred thousand impressions from it, provided the Bank of England will adopt the plan.

Should this proposal be accepted, it would be necessary for me to submit designs of the proposed vignettes, and to confer on the best mode of filling up the writing part of the plate, and of guarding the finishing of the plate, and the taking off of the impressions, so as to preclude the possibility of a misuse of it.

Postscript.—Although I dwell upon the combination of the finest historical engravings, with plates of extraordinary durability, as affording the surest means of preventing Forgeries, I do not propose that these should be used to the exclusion or neglect of any other means which can conveniently be added to increase the difficulty of imitation. I therefore recommend that the best workmanship in the department of Writing-engraving should be introduced, that a stamp from a die of superior execution should also appear; that curious engraving of converging, and undulating lines, such as can only be produced by a very expensive engine, should be further introduced; that a wood-cut of landscape and figures, and engine-

work, executed in the best, and most difficult style, should be printed on the back of the Note; that the paper in its texture and substance, should be essentially different from any other paper (singularity in the water-marks alone, is not sufficient). By thus combining excellence in different arts, the attempt of imitation can only be made by an association of the most eminent professors in those different arts, together with an advance of capital, which, I believe, men who commit Forgeries are never known to possess.

B. B.

Additional Observations.

But if it be supposed that superior engravings will be of no avail, because an inferior artist might make an imitation, although a bad one, and that the public generally would not know a bad copy from a fine original, I would submit the following reasons to the contrary.

To make even a bad imitation of a fine historical vignette, the forger must be an experienced engraver. The present Bank of England Notes are forged by prentice boys, prisoners, &c., and may be, by any one who can use a camel's hair pencil.

Every engraver must be sensible of the difference there must be between his copy and a fine original, and as he would have to fear that the first person into whose hands his imitation chanced to fall might possess sufficient discrimination to see the difference, and detect him, he would be discouraged from making the attempt.

He would be further discouraged by the time and labour that it would consume to copy a fine historical group.

And the public are not so insensible of talent in the arts as is often supposed. Publishers are well aware of

the interest which the multitude take in a well-executed print, and, therefore, give a high price to superior engravers for embellishments to cheap editions of plays and novels. They would not go to this expense, if the public were insensible to the difference between good and bad engraving.

A similar interest would be excited toward a picture on a Bank Note, if the subject were pleasing, and the execution fine.

And a person thus interested in the picture on a Bank Note, and accustomed to view it, could scarcely fail to be struck with the difference that would appear in a copy by an inferior artist, although such person might have no skill in the arts.

His suspicions excited, he would examine and compare the suspected Note with a corresponding genuine Note, and detect the difference, or refer to some neighbour of taste, who would solve his difficulty.

Thus the public would very generally be able to defend themselves against the intrusion of a forgery.

But, because some might be so stupid or ignorant as not to be sensible of the difference between a fine original and a bad copy, surely that is no reason why others of better judgment should be precluded from the means of protecting themselves. As Bank of England Notes are now made, the enlightened and the ignorant are equally disqualified from judging between an original and a copy. If a master-piece of art be introduced into their composition, the means of judging will be supplied; and here I may be excused in observing, that a judgment in the arts being rendered thus daily useful, will go far toward improving the taste of the public in this country.

The objection that hardened steel plates cannot be produced in a sufficient quantity to supply the consumption of the Bank, I do not believe to be well-founded.

Copper plates are producible in sufficient numbers, and a hundred of these are necessary, where one steel plate might suffice. But superior historical engravings are to be introduced on the steel plates, and first-rate historical engravers are but few. To determine accurately how far the whole demand of the Bank may be supplied with historical engravings, we are in want of information as to the number of new Notes, of each denomination, which the Bank issues in a given time. But this information is kept a secret. We are constrained, therefore, to guess at it, and suppose that half a million of one pound Notes are issued in a month. Now, we are assured that the steel plates will stand double that quantity. But if a new plate were required every month, a single historical engraver would have no difficulty in supplying it.

If, however, it turns out that the issue of one pound Notes exceeds the number supposed, and that the steel plates will not last so long as is stated, and, therefore, that fine historical engravings on steel are not applicable to *one pound Notes*, of which the issue is so very considerable, that part of my plan may be abandoned as far as regards one pound Notes. The remaining six, out of the seven arts proposed, may still constitute a sufficient security. But considering fine historical engraving to be the surest test, I would retain it wherever I could; and as all the Notes of a higher denomination than one pound are issued to a small amount, comparatively, the vignettes may be introduced into them without doubt or difficulty, and the security to the public be rendered perfect as the value of the notes ascends.

Thus, a combination of seven superior artists, in separate and distinct branches of the arts, would be necessary to produce an imitation of a Bank Note on my plan, viz.

A first-rate Historical engraver.
Writing engraver.
Rose and other engine engraver.
Die sinker.
Engraver on wood.
Turner on wood.
Paper maker.

But forgeries of Bank Notes are usually committed by inferior and necessitous men, or prentice boys. It is not within the verge of reason to suppose that seven first-rate professors, in distinct branches of the arts, would combine for the purpose of committing forgeries, and more particularly so, as the attempt could only be made at a great expense of time and money; and, after all, could not escape speedy, if not immediate detection.

MR. T. C. HANSARD'S COMMUNICATION.

MEMOIR ON THE BEST METHOD FOR PREVENTING FORGERY OF BANK NOTES.

Peterborough-Court, Fleet-Street,
April 18, 1818.

ALL who have given any attention to this subject, so highly important to the pecuniary interests of the Bank of England, and the English nation, and so imperiously called for by every dictate of humanity, agree in the necessity of forming the BANK OF ENGLAND'S NOTES, which constitute so great a portion of the legal currency of the country, by such an union of talent in the various arts most applicable to the purpose as would render the imitation so difficult, that although not a matter of absolute impossibility, yet that it should require such an unprecedented union of talent in the same person (for forgeries are rarely executed by partners in the crime), and so great a sacrifice of labour, time, and expense, before a single imitation could be effected, as would place the success of any forgery, the farthest possible from all probability. Upon this principle, I beg leave to lay before the Society, of which I have the honour to be a member, a PLAN for a BANK NOTE, possessing, as I conceive, every requisite above stated; and which will, at the same time, be, when once formed, capable of a very rapid production, at a trifling expense.

Many plans of engraved Notes may be suggested, which

would produce a work highly creditable to the Arts and Artists of this country, the imitation of which, by any inferior artist, should be impossible; but still, being within the possibility of counterfeit by the effort of a single hand of superior skill, it might sooner or later be attempted; and when effected, the evil would be increased in proportion to the confidence against fraud, which the execution of the original had given to the country.

My plan will embrace the labours and skill of several artists, each in so difficult and different a branch of art, as to require the study and practice of many of the best years of a man's life before he is competent to execute the finer parts of his profession. The various arts will be wholly distinct, in practice, from each other, and will be proved to be so various and complicated, that, twenty at least being named, no man ever could, or at least, ever did, unite the capability of executing any three of them in his own person. Next, the time and expense necessary to the producing the first One Pound Note on this plan, would be so great, as to put it out of the power of those likely to be engaged in such a crime (even supposing they could employ the requisite artists for the undertaking, and keep them to secrecy) to embark in such a concern; and if even the possibility of an imitation on copper or wood, were granted, it could be done but at the expense of so much time and talent, as would be an effectual bar to the attempt; and even to go farther, and grant it were once effected, the power of pointing out the means of detection in the most minute point or variation, and also of defeating the whole attempt by one of the many changes which in my proposed note a few weeks or days might effect, would complete the security from any attempt at imitation and forgery.

Nothing can offer all these advantages but the perfection of a TYPOGRAPHIC NOTE, arranged, by that art, in

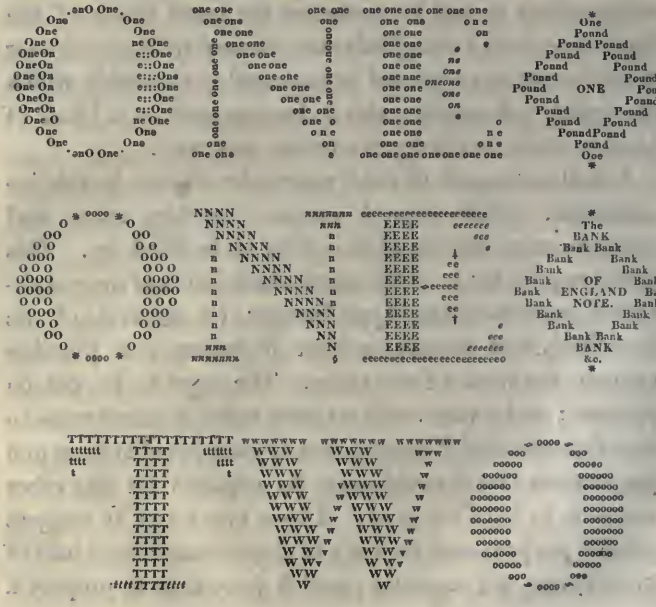
all its nicest forms, with the help of those auxiliary arts with which it may be advantageously combined. And first, the *Chalcographic Art*, to execute from approved designs, four medallions or figures to be cut on blocks of wood, brass, or steel, to give a surface impression, as in the manner of type: and as I would preserve, wherever it is consistent with my design, any part of the form or feature of the present Bank Note, I would have at each top-corner of my note a figure of Britannia, like that now used by the Bank, as their emblem, which might be a *fac simile* of that on the present Notes, having *black* and shaded lines on a *white* ground; below each of these, at each side of the Note, I would have a figure engraved in the contrary style, viz., the figure *white* upon a *black* ground: (example)—on one side an allegorical representation of Liberty, on the other Justice. In continuation of the engraver's art, the centre square to contain a border of exquisite design and workmanship, within which should be contained the usual words of the Bank note, from a design of some eminent writing-engraver in all the various styles of ornamental penmanship which the space will admit; this to be executed on a block of brass or steel, as the figures before proposed.

I shall next speak of the *Typographic* art, and its relative assistants. With type I propose the top, sides, and bottom compartments of the Note to be filled up. This would require the joint and particular labours of the punch-cutter, matrix-maker, type-founder (in several of its branches), and printer, neither of whom can possibly execute the work of the other. The type to be cut on purpose; to be very small, at least equal in minuteness to that denominated *Diamond*, but of such peculiar form and proportions that it could never be required for any other occasion to have the same. I have two forms to suggest for this purpose, and for each of these forms three kinds of type, giving six varieties; and I have then to propose a

type of an entire new appearance on paper, so novel that any legal security might be obtained for it: this would admit of the same changes as the former, and thus give twelve kinds of type, all of the same size, and the English character, and every letter and point of each to be plainly read and understood by any person whatever. The last proposed six forms would render imitation on copper a thousand times more difficult and require additional exertion of skill in the founder and printer.

These preliminary arrangements being complete, the mode of application must be next described.

The top compartment of the note, between the figures of Britannia, to exhibit in letters of about an inch in size the value of the Note, but these letters to be formed by the display, in various ways, of the small Diamond type before described, thus:



or varying one of the words, or the letters, or the lozenge, to the word *Pound*, or any other word; or the whole space might be formed of continuous lines of type, in which the portions necessary to form the large words might be of type of a different face, either lighter or darker in appearance, so that at a little distance from the eye the effect would be of the words One, &c. being dark upon a light ground, or light upon a dark ground; the bottom, and even sides, of the Note to be filled up by the same means and devices. To form the subject of the long, or shade lines, I would have a syllabus of the law either existing or which may exist, relative to the securities against Forgery; it should be made highly penal for any *Punch-cutter*, or other person to devise, cut, make or possess; or *Founder*, to justify, strike, cast, dress, or have or deliver; or *Printer* to have or use, such [described] type, being less in body or face than [Pica];—or any *Engraver*, &c. to draw, trace, engrave, cut, or otherwise form or imitate, or have in possession, &c. &c. I would not propose any general prohibition against such kind of type as may be chosen, lest any opposition should be made against "fettering trade," &c. and therefore only prohibit below such a size as never could answer any purpose for a Bank or Banker's Note; and above all I would have frequent repetition of the warning given upon the French assignats, and I believe present Bank Notes, by which the attempter of forgery should be reminded of his crime, and copy his own condemnation. "*The Law punishes with Death the Forger.*"—"*The Law rewards the Informer to prevent the Crime.*"

The whole of the type and vignette devices being completed, they will have to be formed together, as a complete Note, by the printer; to be proved, till finally approved, and then to go into the hands of the stereotyper for moulding and casting any number of fac-similes which may be re-

quired, preparatory to being ready for printing off: this would depend upon the possibility of size to which the Bank Note paper could be manufactured; if no objection arose on that score, twenty Notes might very well be given at one impression, which at 100 impressions per hour, and 10 hours per day, will, with two men, yield 20,000 in one day, in the manner of fine work; in the ordinary mode they would produce from 30 to 40 thousand.

It will now be necessary to particularise the various artists and workmen, to show through how many hands and processes the whole must pass before arriving at maturity.

Ist, The *Graphic* art will require the Designer and *Engraver;* but as a comparison of possibilities of imitation must be kept sight of throughout, I shall only enumerate—1, the ENGRAVER. The number of artists excelling in wood-engraving (in brass or steel they are still more rare), is, in comparison of copper-plate engravers, probably as 1 to 100.

II. The various arts immediately necessary to form the typographic part—thus: 2ndly of the PUNCH-CUTTER. This is the most difficult and confined art; not more than four or five artists could be found in this kingdom capable of cutting the punches for a Diamond type, nor so many to execute it in conjunction with any difficult plan. The works of one artist in this line are as well known from those of another, as in plate engraving. I know of but three sets of Diamond punches in England; each is distinguishable by a common eye, and by the profession known by whom cut, or rather cast; as the letter-founder is, invariably, the employer of the punch-cutter. The number of punches necessary to complete a *fount*, or every sort used, is very great; an ordinary fount requires about 226; by the addition I first propose, I add 66=292; if both my peculiar sorts are adopted, it would double that

number, making 584; and if the last proposed new kind is also chosen, it will double again—1168: thus near 1,200 punches would be required. An artist of the greatest industry could not cut more than two in a day. After they are completed for the ordinary number of 226, it will take a founder six months in matrix-making, justifying, mould making, casting, dressing, &c. before he could deliver any thing complete for printing; but it should be remarked, that these materials being once perfected, are of everlasting duration, admitting of all the infinitude of change that twelve kinds of type (like the changes upon twelve musical notes) are capable of.

In the LETTER-FOUNDER's Department,

III. The *Justifier* also strikes the matrices into copper, by the punches. This is no part of the punch-cutter's art, it is confined to the founder himself, or his manager.

IV. The *Mould-maker*, also a separate branch of the founder's business; and as I should propose, in order to render the type almost useless in case of fraud, a mode of making it which would be different from the usual mould, that would afford an additional security.

V. The *Caster*—a separate department in the foundery, even the best of whom (and none but the choicest casters can be employed on Diamond, or small type) is incapable of the other departments.

VI, VII, VIII, IX, X—*Breaker-off*, *Rubber*, *Kerner*, *Setter-up*, *Dresser*; all various and separate departments in a foundery, no two of which are ever united in the same hand.

XI. The *Printer's Department*, who, to give effect to the whole, must be consulted in the letter-founding department, and therefore of adequate skill and practice in his profession. He will employ

XII. The *Compositor*, who must be of the most skilful class. Considerable difficulty is, by the form proposed,

left for him to overcome. It would be a work of much time and skill to set up the lines and words; no one whose fingers and eyes were unpractised in small type could work immediately on Diamond. The type would have to be, by the nicest skill and patience, united with the centre block engraving, and top and side vignettes; and then to be turned over to the *Pressman:* the printing business is divided into those two departments, and if they are sometimes in practice united in one man's person, it is in the instances of those brought up in houses of little practice, or in provincial towns, and who are never made perfect workmen in either; it appears physically impossible; for the man whose hands have been hardened by working at press, his fingers swelled, and their extremities hardened to the finer sensibilities of touch, would be found incapable of even feeling Diamond types;—it would thus require at least two hands in the printing department. Next would follow the *Stereotyping Department,* for the casting of the stereotype plates. Some printers profess to execute this also; but they must either be men of most unusual acquirements, and as such well known, or masters assisted by men of practice in the moulding, casting, and picking, or engraving; and stereotyping from Diamond type, and the various minute and difficult combinations above proposed would require the utmost exertion of skill and practice—not less than three hands would necessarily be employed in this department.

The next subject for consideration is the Paper; but on this head I cannot conceive any thing wanting in addition to the present manufacture, except as to the size of the sheets to suit the number of Notes determined to be printed at one impression. I have proposed twenty; a less size than double demy would effect this. As to the fabric of the paper, I would leave that just in the state it now is; nothing more fitting for strength and durability (as far as

those qualifications are requisite), or lightness, for conveniency and commerce, can be proposed. I decidedly object to the idea of printing on both sides of the Note, because, first, either very thick and opaque paper must be used, or, secondly, the opposite, or backing impressions would so blend into and confuse each other, that neither would be distinctly shown; confusion would ensue, and that beauty and clearness of impression would at once be given up, which would be the best safe-guard against imitation; and thirdly, either the time taken for printing off, or the presses and workmen employed would be at once doubled, and consequently the expense increased in like proportion.

The next art to be proposed to perfect the Note, is that of the DIE-SINKER. I would have a stamp of some excellence after the numbering, dating, and signing are completed. The device might be either the royal British arms, or an elevation of the Bank, with an inscription round it, that no other stamp could ever be mistaken for this; the stamp to be in the centre of the Note.

The machinery and mode at present in use for numbering and dating of Notes should be still used; nothing can be more effectual, excepting that the form of the letters of the writing part should be of much better design than the present.

Thus I would produce a Note, which should, in so many parts, present even to the most ordinary capacity such striking peculiarities, that any attempt at imitation, after a sacrifice of time and expense, out of all probability of ever being devoted to such nefarious purposes, must be instantly detected. The learned and the ignorant might be equal judges, from some of the many parts and peculiarities by which it would be formed; every line, every word, and every letter would have a clear character and definition. Such a *letter*, in such a *word*, in such a *line*, being pointed out as erroneous in an imitation, would at once destroy the whole fabric of the forgery; and all

their work would be to do over again, at just an equal chance of detection. In the diamond type alone there would not be less than 5,000 letters upon each Note, all of which would be capable of being pointed out by this kind of latitude and longitude; and any one or more of which might purposely be made peculiar to serve as private marks, known only to the printer and the Bank, the missing of any one of which by the imitator could be immediately advertised to the whole country, as the sure and easy means of detection.* Imitation by tracing for a block or plate engraving, would be a work of immense labour and the most consummate skill; and if done by the latter mode, no eye could be deceived in the difference of impression on the paper—as to the former mode, it may be safely pronounced as next to impossible. In short, nothing but a co-operation of artists and workmen, equal in number and ability to all I have described, with a vast capital for their time and expenses, could possibly effect a forgery, unless we are willing to suppose a mind capable of uniting the will to do the crime, with such a wonderful share of science, ability, and perseverance, at a sacrifice of many years of study and practice, as will be the nearest possible to an impossibility to be contemplated.

I shall now bring under one view the artists I have before stated as necessary to be engaged in my plan.

1. The designer of, and
2. The engraver of the vignettes, medallions, and writing.

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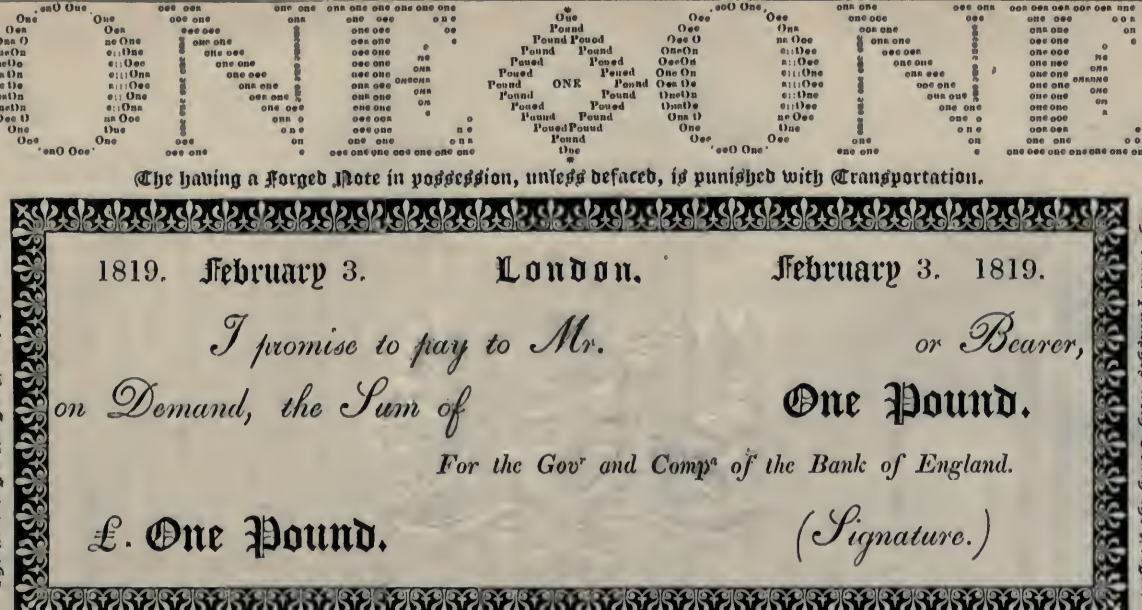
* *Example of Private Marks.*

In line
6 the word person, observe the ʀ, which is a small capital.
13 . . . shape . . . . ɐ, which is reversed.
39 . . . indifferent . . *d*, which is italic.
44 . . . marks . . . . ʀ, which is a small capital.
101 . . . variety . . . *e*, which is italic.
115 . . . course . . . . *u*, the same.

T. C. HANSARD'S Plan for a TYPOGRAPHIC BANK NOTE.



The having a Forged Note in possession, unless defaced, is punished with Transportation.

The uttering a Forged Note, is Felony.

1819. February 3. London. February 3. 1819.

I promise to pay to Mr. *or Bearer,*

on Demand, the Sum of **One Pound.**

For the Gov^r and Comp^a of the Bank of England.

£. **One Pound.** *(Signature.)*

The Law punishes with Death the Forger.

The Law rewards the Informer in order to prevent the Crime.

It is proposed that it may be enacted, that from the day to which the Statute shall receive the Royal Assent, it shall not be lawful for any *PUNCH-CUTTER* or other Person to devise, cut, or possess any Punches for Type being of the entire or form therein described; nor for any *TYPE-FOUNDER* or other person to strike Matrices for or to cast, dress, have or deliver any Type of such described form, shape, or fashion; nor for any *PRINTER* to receive, have or use such kind of Type; nor for any Moulder or Caster of *Stereotype* to mould or cast from any such Type; other than such Persons as shall be authorized by the BANK of England to cut Punches for, or to strike Matrices for, or to cast from such Matrices, or to compose, print, have in possession or deliver; or to mould, cast from or have in possession any Plate or Plates from any combination in which such Type is used, &c. &c.

Observations. In looking at this PLAN for a TYPOGRAPHIC BANK NOTE, it must be clearly understood as offering only a general sketch of the Manner and Form proposed. The TYPE to be of a different appearance from this, or any other to use, though not accordant this in size, and it may be varied to as many as twelve distinct kinds, or faces, all equally legible to be read by the most indifferent capacity; and allowing them an infinite variety of modes and forms, and in the display and arrangement, and capable of any number of private Marks, easily made known to the Country in any possible case of forgery. The Vignettes to be of appropriate design, and fine execution, cut on Brass or Steel. Those of the top corners may be two figures of Britannia, like that on the present Bank Note; those at the sides, allegorical figures of Liberty and Justice. The centre to be a border of chain or other work, executed by Engine-turning or Reses, or of Type device; within which are to be the usual Promissory Words of the Bank Note; the Writing to be in all the various ornamental styles of Penmanship, of exquisite design and execution, upon a Brass Block. This lower part of the Note to contain a Syllabus of the Law necessary to prevent any attempt at Imitation; and other parts to have, in as few words as possible, the condemnation of the Statutes for the protection of the Public from Forgery, as a warning by which any attempter at Fraud must read and copy his own condemnation. The present mode of Numbering and Dating to be preserved, and no alteration is proposed as *necessary* in the fabric of the Paper. The previous arrangements being completed, any number of *fac similes* to be taken by means of Stereotyping. The Note is to be completed with a white or dry Stamp (in the very centre) of the Arms of England, or an Elevation of the Bank, surrounded with the words, in very legible characters, BANK OF ENGLAND. The Cost of the first Note on this Plan is estimated at from 1,500 to 2,000 Pounds, and to take from 8 to 12 months in preparation; but after that the production will be so rapid, that with the labour of four Men only, without the assistance of any Steam Machinery, 40,000 Notes may be produced in a Day of the first Workmanship, at the Expense, including Paper, of Half a Farthing each Note.

The Words here shewn below the Note are only for the purpose of exemplifying the manner in which as endless variety of forms may be devised. Upon these Lines it is proposed to form the Letters of the Value of the Note, or any other word (ENGLAND for instance) by lowering a beavier or lighter faced Type, the appearance may thus be made of dark upon a light ground, or light upon a dark ground.

It can scarcely be necessary to observe that the Types, &c. of which this Scheme is composed and are such as may be collected in the ordinary course of business; the ordinary Engines, Tools and Workmen must be of course doubled, and consequently Expense increased in the same proportion... There are upwards of 6000 Types in the above Specimen.

The Letter-Founding Department.

1. Punch-cutter.
2. Justifier and matrix-striker.
3. Mould-maker.
4. The caster.
5. Breaker.
6. Rubber.
7. Kerner.
8. Setter-up.
9. Dresser.

The Printer's Department.

1. The compositor.
2. The reader.
3. The pressman.

The Stereotyper's Department.

1. Moulder.
2. Caster.
3. Picker.

The Die-Sinker's Department.

1. The engraver.
2. The engine-maker.

Thus, twenty are enumerated; but, in the usual course of trade, more would be necessarily employed—perhaps, in a case of necessary concealment, some one in each department might execute (but not well), the parts of two;

I shall therefore conclude it to be impracticable, with less than twelve, to be engaged in any attempt at imitation by the same means.

The next subject of inquiry may be, the expense; and were it possible for this to be any consideration in effecting so important an object, it will at once be obviated by my showing that so far from causing any increase of charge to the Bank, a vast saving would be effected, independent of the great reduction of expense under the head of Law Charges and Prosecutions. It will appear enormous to state, that the first One Pound Note, upon this plan, will cost from FIFTEEN-HUNDRED TO TWO-THOUSAND POUNDS, and take at least TWELVE MONTHS in bringing to perfection; but, after that, with the expense of six or seven hundred pounds more, to perfect the presses and other apparatus, the production will be so rapid, and at so little cost, that the savings of a few months will defray the whole expense of the preparations, and then the Notes will be produced at the cost of half a farthing each. In order to give an estimate, I will suppose

1. The designs and engravings of the vignettes to cost	£.100
2. The punches for the type, about 1,200, @ £.1	1,200
3. The type, about 300 lbs. @ £.1	300
4. Printer	10
5. Die sinker	100
6. A small proof press	20
7. The border, writing engraver, &c. &c.	100
8. Contingencies	50
	£.1,880

The further preparations.

1. Materials and utensils for Stereotyping from the first formed Note	£.200
2. Casting 50 plates	25
3. Two presses	200
4. Hydraulic press, and glazed boards for smooth-pressing	200
5. Fittings up for wetting, drying, cutting, &c. .	100
6. Contingencies	25
	£.750

Now,

Two presses will produce, at least, 40,000 Notes per day.

Four men, @ 10*s*. . . .	2	0	0
Paper, 4 rm. @ £.4 . .	16	0	0
Ink, &c.	1	0	0
Wetter and dryer . . .	0	5	0
Cutter	0	5	0
Contingencies	0	10	0
Expenses of one day .	£.20	0	0

for 40,000 Notes, is HALF A FARTHING each Note.

It will be strictly congruous with the subject of this Memoir, to consider of the precautions which the Bank might adopt in furtherance of the plan now proposed, to prevent, during the progress of preparation, any thing escaping which might lead to fraud. The first process, or punch cutting, might be carried on within the walls of the Bank; but I should think such a confinement unnecessary and inconvenient. The process must be under the inspection and control of the letter founder,—he

alone, from taste and experience, can decide when they are perfect; numerous alterations and re-cuttings take place before a fount is complete. The subsequent processes in the letter founder's department are so multifarious, require so much room, established apparatus, and various preparation, and yet could be so easily secured, that it would be almost impracticable to establish a foundry for so small a purpose; it would be eligible, therefore, to execute the whole of his business in his regular mode, till arrived at the very last stage;—the punches, matrices, mould, &c. &c. might then be delivered to an officer of the Bank; but, from this period, every thing must be done within its own walls. Three or four rooms would be all the space required. The type, compositor, and his apparatus in one room. The stereotyper in another. The presses, which require about eight feet square each, in a third; and the fourth to be appropriated to preparing the paper, and for the hydraulic press, with glazed boards, for the smooth-pressing, when dry;—the drying could be carried on in all the rooms. The presses would be made so complete for working in the factory of the press-maker, as to be erected in the allotted place in a couple of hours, without so much as nail or screw being applied to the building or room, and ready for instant work. The master-printer and the pressmen would be the only agents afterwards necessary, who, without either noise or bustle, would produce a regular supply of Notes, in number as required. Forty shillings a-year would pay all necessary repairs. The type might be weighed daily during the business of composition. The most dangerous process in this respect would be, the stereotyping; but as this, when every thing was complete, would be but the work of a day or two, the precaution of a confidential superintendence would be easily effected. The original, from which all others would be moulded and cast, must be

carefully preserved, together with duplicate casts, by officers of the Bank, under such restrictions as should be most secure and satisfactory.

The circumstances above stated of the great expense, and length of time to be employed before the first One Pound Note, on my plan, could be fabricated, will preclude the possibility of my presenting any perfect copy of what I propose to be the appearance of the Note. The sketch accompanying this will serve to give a general idea of my meaning, where the description has been defective. The type and white stamp are such as may be procured in the ordinary course of business; the medallions were designed and cut without any reference to the present subject, on wood; but they will serve to give an idea of the effect which a proper design, with finer execution, would have for the proposed purpose.

I shall be ready, at all times, to give any further explanation required, and

Remain, Sir,

A. Aikin, Esq. &c. &c. &c.

Secretary, &c. &c. T. C. HANSARD.

MR. RANSOM'S COMMUNICATION.

71, Judd Place,
April 15, 1818.

SIR;

I REQUEST that you will lay before the Society the inclosed plan, which, in my opinion, will prevent, or at least, greatly diminish the Forgery of Bank Notes.

It consists essentially in a combination of the efforts of men of acknowledged celebrity in the art of engraving, both in the usual mode, and in relief. For this purpose it will be necessary to make use of two steel plates: in one, the letters and ornaments must be in relief, so that they may be printed in the usual manner of letter-press. The other will contain a device composed of engine engraving, and of etching and engraving by eminent artists, the impression of which must be taken off in the common way, by means of a copper-plate rolling press. Thus, the face of the note will exhibit a specimen of high excellence, in each department of the graphic art, and requiring the employment of two plates in its production. The plate containing the designs in relief, must be printed first (if possible, with an ink which will not transfer), by means of that press, whichever it may be, which combines in the highest degree, celerity and exactness. Thus sufficient time will be gained for printing the vignette, &c. contained on the other plate in the most complete and beautiful manner possible.

The subjoined engraving, executed on copper, is a specimen of the vignette, and writing, which would be

One.
I Promise to pay
Mr. Henry Hase
or Bearer
on Demand.
the Sum of
One Pound.
Bank of England.
LONDON.
For the Governor & Co. of the
Bank of England.
One

contained on the second plate; and I take this opportunity to return my warmest thanks to those gentlemen whose names appear on the plate for the prompt and friendly assistance which they have afforded me. On reviewing my own part of this specimen, I have to regret the inadequacy with which my hand has endeavoured to transfer to the copper, the beautiful design of Mr. Thurston.

I have been induced to offer the above plan, from an ardent wish, that by the immediate introduction of a paper currency more difficult of imitation than the present, the sacrifice of human life may be checked, and that the laborious tradesman may no longer be obliged to bear the heavy losses to which he is now subjected.

I am, Sir,

A. Aikin, Esq.
Secretary, &c. &c.

&c. &c. &c.
T. RANSOM.

MR. SOLLY'S COMMUNICATION.

Great Ormond Street,
16th Dec. 1818.

MY DEAR SIR;

HAVING made some experiments for the purpose of ascertaining whether engraving by machinery could be advantageously applied in the manufacture of Bank Notes, I beg leave to submit the result of those experiments to the judgment of the Society.

I have also to submit to the Society a copper-plate printing press, by the use of which the Bank might print their Notes better, and more expeditiously than they can at present, and the persons employed in printing the Bank Notes would avoid the injuries which they frequently sustain by the exertions they are obliged to use in turning the cross.

Should the Society think there is any merit in these communications, much of the credit will be due to others who have kindly given me their assistance, the particulars of which I shall have great pleasure in explaining to the Committee, to whom this subject may be referred. I hope those gentlemen, whose plans for preventing the Forgery of Bank Notes have been already approved of by the Society, will not consider me as their rival, but as being anxious to concur with them in endeavouring to accomplish so important a purpose.

I remain, Sir,

A. Aikin, Esq. &c. &c. &c.
Secretary, &c. &c. R. H. SOLLY.

A Description *of the various Compartments of which the Plate is composed, and of the Difficulties that would be encountered in attempting to imitate the Same, by any other Means than those by which they were executed.*

The description of each compartment will be given separately and unconnected with the rest, because it is not my intention to submit the present plate to the Society as the best model which could be devised for a Note, but as containing specimens of engraving by hand, and by several different machines, all, or any of which, might be made use of, with a view to render the Forgery of Bank Notes, not only more difficult, but considerably more expensive.

The centre compartment, contains a head of Minerva, enclosed in a moulding of concentric ellipses, and encircled by a wreath of oak. For this beautiful specimen of fine art, I am indebted to the kind and able assistance of Mr. Chas. Warren.

Two objections have been made to the introduction of a work of fine art on a Bank Note plate, one of which is, that the public are no judges of fine art, and would not be able to distinguish between a beautiful vignette, and a clumsy imitation of it by an inferior artist. I cannot do better than refer to Mr. Warren's evidence, contained in the Report of the Committee of Polite Arts, for an answer to this objection, by which evidence it appears, that a Bank in the country having had their notes forged, applied to Mr. Warren to engrave a vignette for them, which they made use of both for their notes and bills, during which time, neither of them were forged; they afterwards substituted a cipher for their bills, instead of the vignette, which had not been long in use before it was forged, and they wrote up to Mr. Warren in a great

hurry to engrave a plate for their bills, containing a vignette of fine art. Many of the country bankers employ able artists, at a considerable expense, to make designs, and engrave the plates for their notes, which they would not do, if they did not find the advantage of it. There is this difference between the country bankers and the Bank of England. When a forgery is committed on a country bank, it is obliged to pay the forged Notes, in order to support its credit; but when bank of England Notes are forged, it is the public and not the Bank who are the losers by it. The circulation of the Bank of England Notes is inforced by Act of Parliament. I must admit that the public are no judges of fine art in the sense in which that term is frequently used by connoisseurs, who estimate the value of a work of art solely by its scarcity, or by some arbitrary standard established by the whim or caprice of those who wish to set themselves up as leaders of the public taste. But if a correct representation of nature be essential to fine art, then I think it will be admitted that the public are pretty good judges of the subject. It is no proof of want of taste in a savage, that he admires the rude carving of a face on the handle of a wooden club—he has never seen any thing better; but shew him a good bust, and he will immediately see the difference. Had the people of England never seen any thing better than the engraving of the Britannia on the Bank of England Note, they might, without any impeachment upon their taste, consider it as a most extraordinary specimen of fine art. The vignette upon the Bank of England Note was originally introduced for the purpose of throwing a difficulty in the way of the forger; and, for some time, it probably answered its purpose tolerably well, but the number of persons possessing some degree of skill in the art of engraving has continued to increase, while the merit of the vignette has probably

continued to decrease with each successive copy; even in its present state, I have heard many engravers say, that it afforded them the best means of distinguishing between a genuine and a forged note; the writing engravers would probably be of a different opinion.* Should a work of fine art be introduced, it ought to be a representation of something with which every body is acquainted; as a beautiful female face for instance, or an engraving from one of the fine heads in the British Museum, to which the public have free access. The other objection to the introduction of a work of fine art is, that the Bank could not procure a sufficient supply of able artists to execute the number of plates required for their circulation. The first answer to this objection is, that the Notes might be engraved on steel plates, and if the plates could afterwards be hardened without injuring the work, the Bank could afford to go to a considerable expense in the engraving, as the number of Notes that could be printed from one plate would be almost infinite. But supposing the plates not to be hardened, they would still yield a much greater number of impressions than a copper plate would, and consequently there might be much more time bestowed on engraving each plate. A specimen of engraving from a

* It is only by comparing them together that the public can learn to discover the superior execution of the genuine Notes over the forged ones. The Bank, by the means to which they had recourse, in order to get all the forged Notes into their own possession, effectually prevented the public from making this comparison. In consequence of some legal proceedings the Bank have recently been induced to permit the owners of forged Notes to retain possession of them, having stamped them with the word 'forged.' I think both the Bank and the public are much indebted to those gentlemen by whose firmness in resisting the demands of the Bank, this change in its proceedings was effected. Not only are the public better able to distinguish good Notes from forged ones, but they have also the satisfaction of knowing that all the Notes which are refused payment at the Bank as being forged, are so in reality.

steel plate, decarbonised on the surface, was presented to the Society by Mr. Warren. Steel has also been used in America for the purpose of engraving Bank Notes, and I apprehend that with a little practice Bank Notes might be engraved on steel plates nearly as cheap as on copper. But, should steel not be used for engraving Bank Notes, I still think that a good vignette might be introduced without much more expense than the Britannia costs at present, provided it did not contain a greater quantity of work. The Bank must, of course, go to the expense of getting a good design and a fine engraving, executed in the first instance; from which original all the impressions must be taken for the engravers to copy, and it should be kept for that purpose solely. A copy should never be made from a copy. The Bank must also employ a few good artists to superintend the execution of the rest. I should recommend a vignette of bolder execution than the one on my plate, which is too delicate to stand a sufficient number of impressions, but it may serve as an illustration of the way in which I think a good vignette might easily be executed. If the wreath, the helmet, and the face, for instance, were distributed to as many engravers, and each kept constantly employed on the same part, each would learn to execute his own part with great correctness and dispatch, and a series of nearly fac-similes would be produced; but should one of the engravers be disposed to forge a Note, he would not be able to execute it without the assistance of the rest. I do not think it would be more difficult to make a correct copy of a good engraving than of a bad one; but the same quantity of error which would escape detection in the copy from the bad original would be instantly observed in the copy from the good one. One engraver might copy a piece of hand-ruling done by another, so nearly that it would be almost impossible to tell which was the original and which was the

copy; not that the copy would be a fac-simile of the original, but there being some trifling errors in both, it would require a very minute inspection to distinguish the one from the other; but if an engraver was to attempt to copy by hand, a piece of ruling done by a good machine, the original being perfectly correct, the least error in the copy would be instantly detected. If I am right in the view which I have taken of the subject, a good vignette, or at least, one much better than the present Britannia, might, without difficulty, be introduced on the Bank of England Note, which would be a great assistance to the public in distinguishing between genuine and forged Notes.

Though on this subject, as on many others, I differ in opinion from the Bank Directors, it is but justice to them to state, that I sincerely believe their intentions have been to do that which they thought was most for the public good. I think public bodies should have some regard for the credit of their country. I understand that English art is not much respected on the continent. I hope foreigners do not take the Bank Note for a specimen of English art. But to return to a description of the plate. The vignette is surrounded by a circular band formed by three sets of straight lines; one set consists of radial lines, and the two others of lines terminating at the same point as the radial lines, and forming acute angles with each other, and which would, if produced, be tangents to the same circle. Each set consists of 180 lines. The radial lines intersect the tangent lines precisely in the same points in which the two sets of tangent lines intersect each other, by which means the smallest deviation from the truth would be easily perceived.

The engraving-engine, with which this band, and some other parts of the plate were executed, was made for me by Mr. Allan, and I engraved the band for the purpose of trying the truth of the circular part of the instrument,

which is made on the same principle as Mr. Allan's engine for dividing mathematical instruments, rewarded by the Society with their gold medal, and described in the 28th volume of their Transactions. I do not believe that the most experienced engraver could imitate this part of the specimen by hand, or by any machine in common use, without making such errors as would be immediately perceived. The band already mentioned, is surrounded by one engraved with a rose-engine. An endless variety of patterns might be executed on a similar principle, which it would be extremely difficult to imitate without an expensive instrument of a similar description.

Next to this is a rectangular space of uniform tint, consisting of perfectly parallel and equidistant straight lines, cut with the engraving engine. The writing on this part of the plate was executed by hand in the usual way by Mr. Gullan.

Immediately above the last-mentioned space are two tablets. The right hand one was etched by Mr. Turrell with his ruling machine, the whole being first bit in slightly; the letters were then stopped out with varnish, and the rest bit up to the color required. The left hand tablet is rose-engine work. Corresponding with these, but below the vignette, are also two tablets of which the right-hand one is rose-engine work, and the left-hand one cut with the engraving-engine.

The number of the Note might be printed on the rose-engine tablets.

The tablet on which June 4th, 1818, appears in white letters, was etched by Mr. Archer with his machine for ruling waved lines, and then bit in with aqua fortis, the letters and figures intended to be white being first stopped out.

The tablet on which June 4th, 1818, 1st plate, appears in black letters, was executed for the purpose of ascer-

taining the correctness of my engraving engine. The tint is formed by three sets of straight lines, intersecting each other precisely in the same points, so as to produce a series of equilateral triangles, all of which are precisely of the same size. I do not think this part of the plate could be imitated by hand, or by any other machine at present in use, except that by which Mr. Armstrong engraved his two plates of Mr. Allan's Theodolite for the Society, and which is in this respect similar to mine.

I believe Mr. Armstrong was the first person who applied a machine upon this principle to copper-plate engraving.

Should there be the least irregularity in their width, it would be immediately perceived by the three lines not intersecting precisely in the same point. The screw by which the distance between the lines is regulated, was cut for me by Mr. Allan, who was rewarded by the Society for his mode of cutting a true screw. The instrument he produced to the Society was only calculated to cut a screw of 2 or three inches in length, but he has since made an improvement in it, by which he is able to cut a much longer one; the screw which he cut for me is about 15 inches in length, and the present plate is a severe trial of its correctness. The narrow border which surrounds the writing, was cut with the engraving machine, and consists of lines equal to each other in depth and thickness, placed farther from each other in regular gradation. At right angles to the tablets already described, are two others of close tint, the one engraved and the other etched, in order to show the difference of similar work by an engraving and etching machine. These two tablets were executed by Mr. Turrell and me as a trial of our respective machines. The left-hand one was etched by Mr. Turrell, and the right-hand one is mine. The engraving is on the whole the more even tint, but I do not think there is sufficient difference between them to be easily perceived by a person

not accustomed to examine prints; when the plate begins to wear, I have no doubt the difference will be very perceptible. Mr. Turrell had an accident with the biting, the first time, and was obliged to take it out; he therefore hardly had a fair chance, on account of the difficulty of knocking up a good surface to the copper. These close tints, particularly when etched, will not answer for Bank Notes, on account of the difficulty of printing them; I did not expect they would, but I was persuaded to make the experiment. The upper tablet is cut with the engraving machine, and consists of parallel and equidistant lines, each line being thin in the middle and thickening towards each end by a regular gradation. This might perhaps be imitated by first ruling the lines with an etching machine and then engraving them up by hand; but it would take an expert artist a great deal of time to accomplish it.

The lower tablet is also cut with the engraving machine; the lines are all parallel and equidistant, each line being thicker than the preceding in regular gradation. This might perhaps also be imitated in the same way as the preceding tablet, but not without considerable difficulty. Some trifling errors may be perceived in this tablet, upon a very close examination. The part of the machine upon which its correctness depends, was not in perfect order when it was done. There are still some farther improvements which I propose making to my machine, and when I have made it as complete as I can, no doubt still farther improvements will be suggested by others.

The inside dark border with narrow white lines was etched by Mr. Turrell with his machine, and the outside dark border was engraved with mine; this was also a trial of skill between us and our respective machines. I think upon a close examination, the white lines on the engraved border will appear sharper and of more uniform thickness from one end to the other; but the difference, if

any, is not sufficient to be of practical utility in the prevention of forgery.

I produced the copper-plate to the Committee for the purpose of showing that the outside dark border was engraved with a tool which made the bottom of the lines flat and of equal depth, and therefore capable of affording a cast which might print stereotype, a property not possessed by common engraving or etching, since in both these processes, the lines in the copper are not flat at the bottom. Lines may be cut with this engine to any required width and depth. I am not sufficiently acquainted with the process of stereotyping to judge whether it is capable of taking a cast sufficiently correct to do justice to fine engraving. The corner pieces were etched by Mr. Clement with his machine, for which he was rewarded by the Society with their gold medal, and a particular description of it is given in the present volume of the Transactions. They consist of 1st, a spiral line; 2nd, portions of ovals forming a rose. 3rd, a tint of concentric ovals. 4th, a globe with parallels of longitude.

It was my intention to have filled up the corners with an ornamental pattern, stamped with punches cut for the purpose, but finding considerable difficulty in getting the punches cut to my mind, I availed myself of Mr. Clement's offer, to put in the corner pieces with his machine. I think stamping a pattern with punches might be introduced with advantage on a Bank Note plate, on account of the uniformity that would be produced by it, and the expedition with which it would be executed. I mention this in the hope of inducing others to try the experiment. The exterior border of the plate represents a double linked chain, and was etched by Mr. Clement with his machine; previous to the biting in, the lines were stopped out at the points in which the links intersect each other, and the chain

was afterwards graved up by hand by Mr. Davis; each link consists of five concentric ellipses, and all the links are perfectly similar and equidistant. I conceive it would be impossible, without the use of a similar machine, to make such an imitation of this chain as would not be immediately distinguished from the original. A similar machine could not be procured without a considerable expense, on account of the accurate workmanship required in its construction.

It must occur to every person conversant with the art of engraving, that the time required to grave up the intersections of the links would be an objection to this pattern being used in a Bank Note; but Mr. Clement states, that he could easily make an addition to his machine, by which the point that traces the lines would rise from the plate where the links cross each other, and by that means the labour of stopping out, and subsequent graving up, would be avoided.*

I hope the Society will make an allowance for any imperfections which may appear in this plate, when they

* The figures 4 : 6, which appear in various parts of the plate, indicate the 4th of the 6th month (June).

The date being inserted at length, may be repeated short in various places; hence the forger can only print from one plate, Notes of the same date; for if the date was frequently repeated, by taking it out from all the places, the plate would be so much injured that there would be as much difficulty in repairing it as in engraving a new one. If the issue of Bank Notes of the same date is greater than one plate can furnish, by inscribing each plate 1st, 2nd, &c. the forger is confined within still narrower limits; and as soon as a forged Note comes into the Bank, the farther circulation of the forged Notes from the same plate, may be prevented, by cautioning the public against a forgery of the 4th of June, 1st plate, for instance, pointing out, at the same time, some of the particulars in which the forged Notes differ from the genuine ones of the same date. Thus I think I have shown, that the Bank have it in their power to render it very difficult for the forger to imitate a Bank of England Note plate, and when he had executed the plate, the Bank could prevent his making much use of it.

JUNE 4th. 1818.

One

An Attempt to prevent

Forgery of Bank Notes.

June 4th. 1818. 1st Plate.

consider that that part of it which was done with the engraving-engine, was executed by myself, and that I had to learn my art as well as to get the tools made, and complete the engine whilst I was engraving the plate.

This engine being made for the common purposes of engraving, has only such movements to it as are usually wanted in copper-plate engraving; had it been intended for Bank Note engraving, it would have been easy to have made such additions to it as would have executed patterns which are not usually wanted in copper-plate engraving, and which, therefore, all persons not employed by the Bank of England might be prohibited from using.* In order to show how well engraving done by this machine will stand, I exhibited to the Committee an impression from a copper-plate, in which the back ground was engraved by this machine, and this part, although very light at first, stood four thousand impressions without any repair, while the other parts of the plate were obliged to be frequently repaired. The tablet of the same plate also engraved by this machine, was originally a little too dark, and after four thousand impressions had been taken off, it still was not become light enough. Any number of plates could be engraved by this machine, so nearly alike as not to be distinguished from each other.

Bank Notes must be printed on hard paper, that the

* It may perhaps be said, that supposing the Bank were to issue such Notes as could not be imitated without the use of expensive and complicated machinery, that although such Notes could not easily be forged in England without detection, they might be forged abroad, and sent over here; and supposing we were at war with France, for instance, the French government might not only connive at, but even advance money to promote the forgery of Bank of England Notes; but it can hardly be supposed that any government would encourage so infamous a crime; and without the connivance of the French government, it would be as difficult to forge the Notes in France as in England.

ink may not run when they are signed; the paper must also be thin: it is the general opinion that a good impression of a fine plate cannot be printed on such paper; in order to try the experiment, I had some impressions of my plate taken off on thin hard paper, and although the impressions were not so fine as those on India or French paper, they were full as good as those on English paper, which is commonly used for book plates in respectable works. One of the impressions on thin hard paper is in the possession of the Society. Mr. Allan also exhibited to the Committee a good impression of delicate machine ruling printed on a Bank of England Note. Indeed I must do the Bank the justice to say, that the paper on which their notes are printed is extremely good of its kind.

I do not believe it to be possible entirely to prevent forgery, but that is no reason why every exertion should not be made to render the imitation of Bank Notes as difficult, and the detection of the forged ones as easy, as possible. The country Banks are as much interested in this question as the Bank of England. The country Banks have lately been but seldom forged upon; because the Bank of England Notes are not only more easily imitated, but on account of their wider circulation, the forgeries of them are more easily passed. Should the Bank of England make their Notes very difficult of imitation, the forgers will then employ their ingenuity in copying the country Bank Notes.—It is hardly to be expected, that any one plan will be successful in checking forgery for any great length of time. Many things can now be easily executed that were very difficult some time ago, and probably many things, which are now considered difficult, will cease to be so at a future time. The Bank must not suppose that they may safely stand still while the rest of the world are going on improving in knowledge and

science; they also must avail themselves of the successive improvements.

It has been stated, that the Society, by giving publicity to the means of checking forgery, will also give publicity to the means of committing the crime, and will consequently do more harm than good.

To this it may be answered, that those who are disposed to commit forgery will easily procure the necessary information without the assistance of the Society. The more the attention of the public is called to the subject, and the more information they have upon it, the more easily will they distinguish between genuine and forged Notes, and the more difficulty will the utterers of forged Notes find in passing them without detection. It is generally supposed that the Bank of Ireland Note is engraved with machinery, and I understand it has been found very effectual in checking forgery. Having had the pleasure of presenting to the Society the instructions published by the Bank of Ireland, to enable people to distinguish between a genuine and a forged Note, together with a proof of the Note itself, I shall here give a copy of the instructions, as I think it will be useful to make them more generally known in England.

"The Notes of the Bank of Ireland, of five pounds and "under, may be easily distinguished from the forgeries "now in circulation, by observing, 1st, the general per- "fection which prevails in the execution of every part of "the Note. 2nd, The extreme regularity and identity "of character prevailing throughout every part of the "border; the scrolls of which it is composed being "without the least perceptible variation. 3rd, The small "black worm lines inserted on the white ground in the "scrolls of the border, which are, as to form, absolute "fac-similes of each other. 4th, The edgings round "the sum, of which the distinguishing characteristics

" are, extreme precision, uniformity and perfect execution.
" 5th, In the vignette, the correct delineation of the crown,
" ribbon, and female figure, and the distinct formation
" of the words, ' Bank of Ireland,' in black, and the
" Latin motto in white letters, which are inserted in the
" ribbon."

The Bank of Ireland communicate to the public the information by which the good Notes may be distinguished from the forged ones, while the Bank of England appears to rely principally upon certain scratches and dots and pecks, and secret marks which can be of no guide to the public so long as they are really kept secret; and being easily imitated by the forger, they only tend to mislead as soon as they become known. I think it probable that the Bank clerks themselves have sometimes been deceived in consequence of the secret marks being imitated in a forged Note.

It will be of no use for the Bank to have their Notes finely engraved, unless they are also well printed.

Mr. Ramshaw's mode of heating the plates by steam instead of a charcoal fire, described in the present volume of the Society's Transactions, is a great improvement in the art of copper-plate printing; by adopting it, the Bank would avoid the danger of fire, the inconvenience from the dust, and the injury to the health of the printers, which arises from the vapor of the charcoal. The Bank should endeavour to make all their Notes as much alike as possible; whereas, by printing what is called firsts and seconds, that is, taking two impressions off the plate each time it is inked, they seem to study to render the impressions, off the same plate, as unlike as possible. Neither of the impressions are good ones; the first being too dark, and the second too light. The printers are frequently strained and seriously injured by the great exertion they are obliged to use in turning the press to

take off the second impression. It is unnecessary for me to enlarge upon this subject, as the particulars were stated to the Commitee by Mr. Restiaux.

The advantages of taking two impressions off the plate for once inking are, that some time, and consequently some expense is saved in the printing, and the plate not being wiped so often, will probably last rather longer.

It may very reasonably be asked how are the Bank printers to produce fine impressions of such plates as the one here submitted to the Society as a specimen, seeing that fine impressions cost much more for the mere labour of printing than common prints do; and this is but just, because there is more time bestowed upon the wiping of the plate when fine impressions are to be taken off, than is done where the number required is considerable, and, consequently, dispatch is the most important consideration. In order to enable the Bank to print their Notes much better than at present, and with the same dispatch, I should propose that a copper-plate press be used for this purpose, of such construction that it may be set in motion by any convenient power, as steam, for instance. The requisites of this press will be understood, by attending to the following considerations: In the first place, it is well known that fine impressions can only be produced by thick ink, and this cannot be forced into the lines engraved on the copper-plate without considerable care and labour. Secondly, the thicker the ink, the more time and labour it requires to wipe the superfluous ink off the plate. Thirdly, when the plate is so prepared, it is absolutely necessary that the pressure of the cylinders should be very great, and the motion slow, that there may be sufficient time for the paper to be driven into the lines engraved on the plate, and thereby receive a fair and perfect impression. If a press was so constructed, that the printer could, by throwing certain parts into gear,

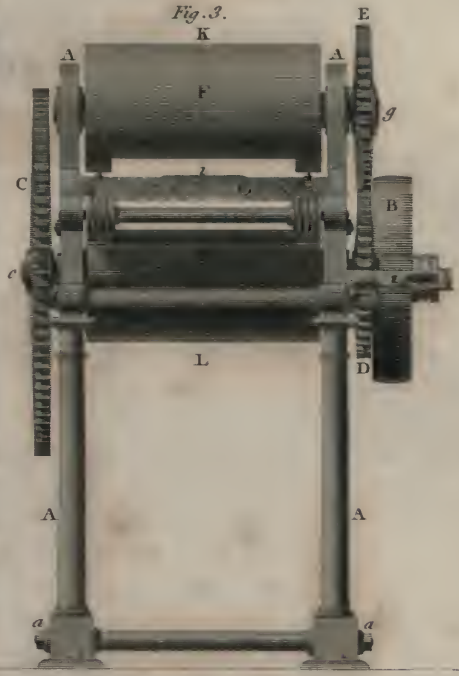
communicate motion to it whenever he pleased, it might be left to complete the operation of taking off the impression, while he was preparing another or second plate; by this means, the time which is now employed by the printer in turning the press, would be saved to him, which time he might be employing in a more careful attention to the inking of the plate. There should likewise be a provision in this press for throwing itself out of gear when the impression is completed, and also for returning the plank of the press to the same position from which it started. By the time this has taken place, the printer will be ready with the second plate, which will now be placed on the plank, and the press being again thrown into gear, the operation will proceed as before. The following engraving and description will show how capable these ideas are of being realized.

Fig. 1, represents a side elevation of the press, the parts of which are as follows:—

A A A represents one side of a cast iron frame, the other side being a duplicate. The two sides are united by six braces, which are made fast by the nuts *a a a a a a*. B represents a wheel which it is intended to set in motion, by a band, in the usual way, the band being passed over a drum, which may receive its motion from a steam-engine, or any other convenient mechanical power. Upon the axis of the band wheel B, is fixed a pinion, which gears into, and gives motion to the great spur wheel C. The great wheel C, is fixed upon one end of the axis *c*. This wheel gives motion to the lower roller *e*, and likewise to the spur wheel D, fixed upon the same axis, both wheels moving in the direction of the darts *f f*. E, represents a similar spur wheel to that shown at D fixed upon the axis *g*, of the upper roller F. The direction of this wheel, when geared into, and set in motion by the wheel D, is shewn by the dart *h*. G, represents the side or

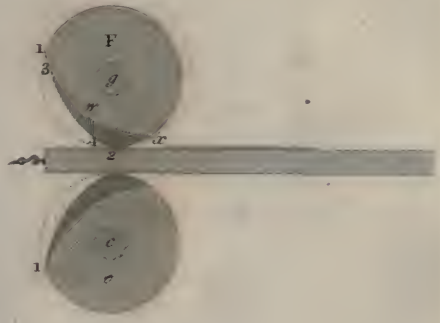
End Elevation.

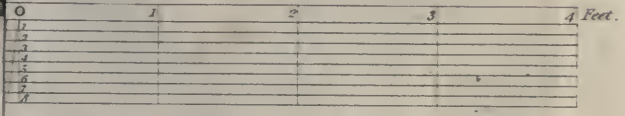
Fig. 3.



Section of the Rollers and Table.

Fig. 4.





Bank Notes.

Engraved by Edm^d. Turrell.

edge view of the mahogany plank, upon which is laid the copper-plate *i*. In the usual manner, the screw, shown at *k*, is used to elevate or depress the lower roller *e*, so as to increase or diminish the pressure upon the copper-plate, as occasion may require. To effect this in the best manner, the axis *c*, is made to work at each end in brasses, the brasses moving in mortises formed for that purpose in the cast iron frame. It may be necessary to observe, that there is a similar screw to that shown at *k*, on the other side of the press, used for the same purpose, namely, that of elevating or depressing the axis *c*. The further explanation will be greatly assisted by referring to fig. 2.

Fig. 2, represents a plan of fig. 1, the same letters of reference being used upon the same parts, wherever they can be seen. H represents a projecting arm that has the centre pin *l*, fixed at its end, upon which the lever *m*, moves. This is used to move the band wheel B, upon its axis, until the two fixed pins *n* and *o*, fall into gear with the coupling box P; and when the wheel is so placed in gear, it is kept in that position by the catch-piece *q*, holding the end of the lever *m*. The catch-piece *q*, swings on the fixed pin or axis *r*, and continues to hold the lever *m*, in the position here shewn by the action of the spring *u*, until the copper-plate has been completely passed through or between the rollers and a little more; when, at that moment, a pin *s*, fixed on the circumference of the wheel D, elevates the end *t*, of the catch-piece *r*, and depresses the catch *q*; by which means the lever *m*, is released and forced back to the position shewn by the dotted line *v*. This is effected by the action of the spring fixed to the lever *m*, shown at *y*, which of course draws the band wheel B, and its two pins out of gear, and the moving parts of the press instantly become stationary. The catch-piece *q*, is again

brought to its original position, and fit to receive the end of the lever *m*, by the spring *u*, before named: the position of this may be better seen at *u*, fig. 1. I, represents an axis, at each end of which is formed a cylindrical box, or barrel, containing a spiral spring: each of these barrels has a cord coiled round it, one end of which is made fast to the barrel, and the other end is furnished with a hook, which is placed in a staple fixed at each end of the plank G. By these springs being in a state of tension, the plank G, is kept in the position here shown; but when the press is set in motion, the rollers force the plank and plate to move forward, which uncoils the cord, and winds up the springs contained in the barrels, by which means, when the rollers disengage the plank, the force of the springs is applied to coil up the cord, and thereby return the plank to the position here shown.

Fig. 3, represents an end view of the press, in which the action of the rollers, and the peculiar shape of each will be better seen; but, for the purpose of elucidating the operation more clearly, a section of the rollers and plank is given in fig. 4, the section being taken through the line K L of fig. 3.

Fig. 4, represents a section of the rollers and plank after they have carried the plank forward, and are about to be disengaged from it; this is effected by the peculiar shape of the rollers, which I shall now endeavour to explain. F, represents a section of the upper roller, the external surface of which is an uniform cylinder, from 1 to 2. The remaining portion of the cylinder is removed so as to leave a surface as represented by the line 3 4. After this is done a second portion is cut away, leaving at each end the projections seen better at 4 4, in fig. 3, both rollers being the same, their shapes appear similar, except that in this figure the upper roller is represented with a blanket placed round it, which is fastened with pins in

the usual way in the recess formed in the roller. This is shewn by the overlap of the blanket at *w*.

When the rollers are set in motion, the parts 1 and 1 come in contact with the plank, the one above, and the other below, and, by their motion, carry the plank forward, and with it the copper-plate, upon which the paper is laid in the usual manner. This motion is continued until the copper-plate is completely clear of the upper roller, which, however, still continues to carry forward the plank until the edge formed by the intersection of the two curves at *x* is sufficiently raised to let the copper-plate pass freely under it, which it does, as the rollers proceed on in their revolution, for they then disengage the plank, and permit the spiral springs contained in the barrels to return the plank to the position from which it started.

It is but justice to Mr. Clement, to state, that it is principally through his assistance I have been enabled to complete these improvements in the copper-plate printing press. Should the Society think this press worthy of publication, I will have the drawing engraved, and present the Society with as many impressions as they may require for that purpose. I shall also have great pleasure in presenting them with impressions from my plate, engraved principally by machinery, to accompany their report on the best means of checking the forgery of Bank Notes.

P. S. I am afraid the close tint, etched by Mr. Turrell, with his machine (*see* p. 48), will not stand the number of impressions required for the publication; in that case, I must be under the necessity of having it taken out, and requesting Mr. Turrell to put in something else in the same place that will stand better, and not be so difficult to print.

Mr. Williamson's Description of his two Steel Plates.

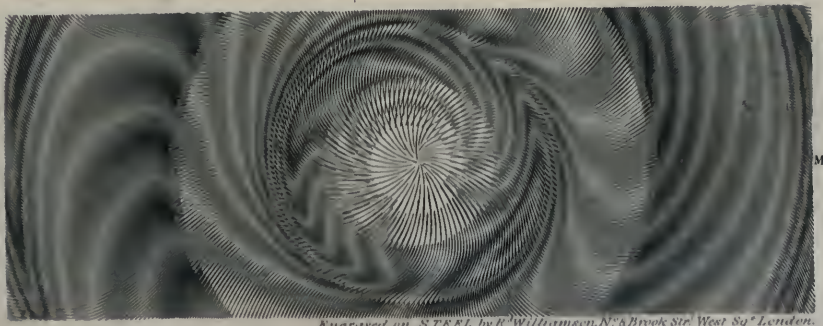
8, Brook Street, West Square,
7th April, 1819.

SIR;

THE Society of Arts having kindly consented to print, and the Committee, to whom it was referred, having selected two steel plates of mine to be introduced with other specimens in their Report as to the best means for the Prevention of Forging Bank Notes, I should be particularly obliged by an introduction of this letter, which will, perhaps, be sufficiently illustrative, without going into abstract matter. As the subject has long occupied my attention, so I trust the specimens selected by the Committee on the 5th instant will prove that they are not the produce or works of chance, as has been repeatedly asserted; to which, I can only add, I am ready to engrave again any pattern offered by me to the consideration of the Society. The impressions will show that the steel plates are firm, bold, and clear, yet delicately engraved; so likewise are the copper plates; in proof, I beg leave to refer you to an impression taken after 12,000 copies had been struck off from a plate engraved by me in sixteen hours, for the back of a note of the Monmouth Bank, with cypher B., S., and Co.; and it is clear, that with less than half an hour's work, it would print 8 or 10,000 in addition to the 12,000 already taken off. The steel plates being so much harder, will assuredly stand 100,000 copies at least, as they are engraved deep, and do not require half the wiping to clean the surface that copper plates do; this is a very considerable advantage which steel plates possess over copper plates; at the same time, the steel plates,

from being closer metal, and a finer surface, produce a more brilliant impression; thus much I can state, having printed myself every impression that has been taken from any plate of mine; nor did any one see or know any thing of the steel plates engraved by me, excepting my own family, till I submitted them to the inspection of Mr. Barber Beaumont, a few days prior to his communication to the Society. In the specimens, the plate marked M is intended for the signature of the note; the plate marked N 1 is intended for the back of notes. I hope and trust the indefatigable exertions of the Society in exploring and bringing forward every thing that study, talent, or invention, could produce, will receive the highest encomiums and gratitude from their country. With every respect,

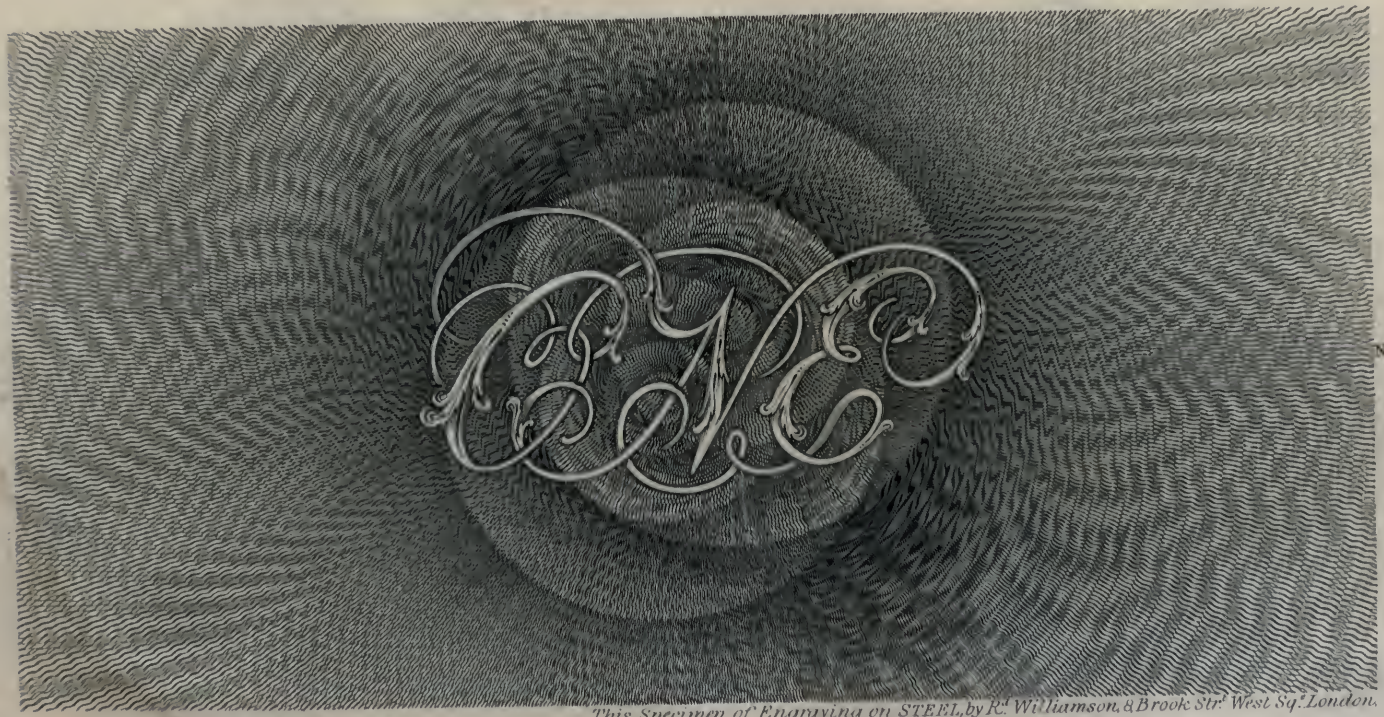
I remain,
Sir,
&c. &c.
RICHARD WILLIAMSON.



M

Engraved on STEEL by R.ᵈ Williamson, N.ᵒ 8 Brook Stᵗ West Sqᵉ London.

For the Signature of Notes.



N.1.

This Specimen of Engraving on STEEL, by R.d Williamson, 8 Brook Str.t West Sq.e London.

For the back of Notes.

Addition to Mr. Ranson's Communication.*

31, Judd Place West, New Road,
April 10th, 1819.

SIR;

On looking into the Report of the Society of Arts, &c., respecting the forging of Bank Notes, I find that part of my communication of the 15th of April, 1818, has been omitted. In consequence, I beg leave most respectfully to offer the following additions:—The *letters and ellipses* should be cut and left standing in relievo; and by this method the plate may be stereotyped almost for ever, and by producing an incalculable number of *fac similes*, will be of the utmost importance.

I have the honour to be,
Sir,
&c. &c.
Thomas F. Ranson.

* In pp. 38 and 39 the name has been erroneously spelt Ransom.

MINUTES OF EVIDENCE.

April 15, 1818.

Read Mr. J. T. B. Beaumont's communication.

Mr. *Charles Heath* presented to the Committee specimens of American Bank Notes, Nos. 2, 3, 4, 5, which in his opinion cannot be forged. The present Bank of England Notes, he considers as very easy of imitation.

Mr. *Ashby* stated, that Bank Notes are in his opinion easy of imitation. He has been upwards of 20 years in business, during which time he has been largely employed in engraving Country Bank Notes. Those into which he has introduced important vignettes, have never to his knowledge been forged.—Several Yorkshire Banks were forged on in the course of last year, but the Notes of all these Banks were engraved in a very inferior manner. Superiority of execution is in his opinion the only effectual method of preventing forgery, and so far he concurs with Mr. B. Beaumont's plan.

Mr. *Williamson* considers Bank of England Notes easy of imitation. He objects to introducing vignettes into a Bank Note, because as they cannot be made an essential part of the Note, it would be easy by blotting ink on the vignette so to deface it, as to render it impossible to distinguish the genuine from the spurious Note, and yet if the other part were entire, the Note would continue to circulate. Mr. W. gave in some

specimens of engine work printed with a different coloured ink from the rest of the Note, according to a plan invented by him, and which has been adopted by Banks at Bath and at Waterford during the last 16 months with complete success, no forgery having as yet been practised on them.

Mr. *Ramshaw* stated, that he was employed to prove a steel plate engraved for Mr. Dyer, in imitation of the American. It weighed 56 lbs., and was more than an inch in thickness. It required a peculiar press; but Mr. R. is of opinion that men who were accustomed to the use of that press, would perform more work than with the common press.

Mr. *Warren* stated, that Bank of England Notes are very easy of imitation, forgeries being generally committed by persons acquainted only with the very rudiments of the art of engraving. He is persuaded, that Bank Notes might be made almost impossible to be copied, by the union of high talent in two or three departments, viz. by combining fine vignettes with intricate engine work. The expense of executing a plate in this style, would no doubt be more costly than where the common work is had recourse to; but this increase of expense would be more than counterbalanced by substituting steel for copper, in consequence of the durability of the former being more than ten times as great as of the latter. From his own experiments he is convinced that softened steel may be cut very nearly as easily as copper. About 7,000 copies are taken by the Bank of England before the copper plates used by them require to be retouched, but he is informed, from good authority, that a steel plate would furnish 100,000 copies without requiring repair. He is of opinion that an able artist might make a perfect *fac simile* of his own work, but not of a capital production by another artist.

Mr. *Pye* stated, from his own experience, that etching and engraving on blocks of softened steel, may be done with as much ease as on copper; and the block when hardened, will, in his opinion, furnish a vast multitude of impressions. He also states, that a steel block after having been hardened, may be again softened and repaired, and afterwards a second time hardened. He has seen forged assignats, notwithstanding that many various kinds of engraving and printing were employed on them.

Mr. *Gill* stated, that steel blocks for engraving Notes, may be a second time softened and hardened without difficulty.

Mr. *Silvester* stated, that he has engraved plates for nearly 100 Banks. From 5,000 to 6,000 copies are generally taken from one copper plate. He does not consider the Bank of England Notes as very easy of imitation, but is persuaded that they might be made much more difficult of imitation by employing better artists. Those Country Banks that have chosen to go to the expense of good vignettes, have never been forged upon as far as his experience goes.

Mr. *White* considers Bank of England Notes to be not at all difficult of imitation. He formerly sent into the Bank of England a plan similar to that of Mr. Beaumont, but upon a different principle of execution. Is most fully convinced, that in order to meet every requisition for the purpose of preventing forgeries, and giving facilities of execution requisite to the large diurnal demand of the Bank of England, copper plate engraving as a system, and especially exquisite historical work, appears the most unlikely means of effecting the desired end, and is liable to insurmountable objections.

April 18.

Mr. *T. C. Hansard* stated, from information on which he can rely, that the American Notes executed by Murray, Draper, Fairman and Co., of Philadelphia, are erroneously supposed to be printed directly from steel plates. The manner of the engraving of the ends of the Notes, and the small Medallions indicative of the number of dollars, plainly indicate a different process from ordinary plate engraving: the impression of those parts must necessarily have been given by the surface of the plate, not by the bottom of the lines. The following is the process: The engraving is cut and punched on steel plates, or blocks previously softened, and afterwards hardened again. These plates are then passed repeatedly between cylinders of soft steel, which latter thus receive the impression in reverse of the plates.*

Mr. *Engleheart* stated, that Bank of England Notes are easily forged; that comparatively few forgeries take place on Country Notes, in consequence as he apprehends of the superior execution of these latter.

Mr. *Ranson* stated, that the Bank of England Notes are very easy of imitation, that the impression of a Note may easily be transferred to the surface of a copper plate by means of wax. He thinks Mr. B. Beaumont's plan too complicated, and on this account not likely to be adopted by the Bank of England.

Mr. *Ramshaw* stated, that he has heard from good authority, that the daily issue of Bank of England Notes of all

* Farther details on this subject are contained in Mr. Clymer's evidence, May 15.—(*See* p. 68.)

descriptions, is about 60,000; in producing which, about 53 pressmen are employed.

Mr. *Warren* stated, that the steel plate proved by Mr. Ramshaw was not hardened. He presented, 1st, a specimen of the first vignette executed by him for the Plymouth Bank, and which has never been forged; 2nd, a specimen of the cypher used by them, which has been forged; 3rd, a specimen of another vignette executed by himself to replace the cypher, and which has not hitherto been forged.

April 25.

Read Mr. T. C. Hansard's communication.

[In answer to questions from the Chair, Mr. Hansard stated, that it would be very easy for the Bank to introduce private marks in the proposed Note, by slight variations in one or more of the letters of the words printed in diamond type, by the combination of which words, the large letters are formed. Of the letters in diamond type 5,000 or 6,000, would be employed in each note. The time required by the best artist in cutting the punches for the matrices of this diamond type, would be from 6 to 9 months. The cost of the whole apparatus as far as the printing is concerned, presses included, would be from 500*l.* to 1,000*l.* The cost of the Notes, including paper, would probably not exceed 20*s.* per 1,000.] Mr. Hansard produced specimens of stereotype diamond type, and of paper capable of furnishing 24 Notes per sheet.

Mr. Hansard being asked whether it would be possible for the 12 or more artists required to produce a Note on his plan, to make a *fac simile* of the same, replied, that he thought it was impossible. It is no easy matter for one artist to copy

his own work without alteration, and that twelve or more in such different lines of work should concur with perfect success is almost impossible.

Mr. *B. Beaumont* stated, that subjects composed of diamond type have already been before the Bank Directors.

Instead of employing the diamond type in composing large letters on Mr. Hansard's plan, Mr. B. proposed to introduce along the top of a Bank Note, as many different alphabets in the smallest type as could be compressed into one line; to repeat such line eight or ten times, one closely under the other; thus the greatest variety of punches would be required, and by placing eight or ten specimens of each punch in a row, in immediate comparison, imitation by engraving would be prevented, as the engraver could not make every letter so exactly alike as to appear to come from one punch.

Mr. *Turrell* stated, that the writing of the present Bank Note is very well engraved, and that in his opinion, a writing engraver would not be able to imitate one till he had been at least a year in the practice of his art; he has seen writing engravers pupils occupied for a whole week in copying one letter, and at the end of that time have been very far from perfectly succeeding. A *fac simile* might, in his opinion, be made of any mode of engraving, with a difficulty proportioned to the skill of the artist, and the style of the work to be copied. By pencilling over a Note, and then taking a copy of it, even the best engraving might be imitated by a skilful artist, so as to deceive ordinary observers. Of writing engravers there are several classes; some confine themselves to german text, some to stump hand, &c., and some are general engravers. Every writing engraver who can execute a good card, may imitate a Bank Note.

The plan proposed by Mr. Hansard would be peculiarly difficult of imitation in copper. All that part of Mr. Hansard's Note, which is in stereotype, must be imitated by cutting protruding characters on the copper; a process so unusual and so difficult that hardly one person could be found capable of executing it, where 500 might be found able to imitate the present Bank Note. To imitate throughout on copper the Note proposed by Mr. Hansard would require the practice of a life.—The only other way of copying Mr. Hansard's Note would be by wood engraving, but this method of cutting cannot represent the sharpness of the punch used in making types. He prefers the stereotype to copper-plate engraving as requiring the combination of a greater number of artists. Another advantage in stereotype is the greater facility in printing from it than from copper. The work of all engraving machines might he thinks be imitated by hand so as to deceive most of those into whose hands Bank Notes fall, except in the case of large tints. And it is his opinion, that any imitation of type printing by means of copper-plate would be easily detected, because the type gives an indented impression, and copper-plate exactly the reverse; all the lines in the latter mode being raised above the surface of the paper, while that printed from type is considerably indented. The consequence is, a very material difference in their general appearance.

Mr. *Gill* presented a specimen of paper in which the water mark is more opaque than the ground.

May 2.

Mr. *Turrell*, in addition to his former statement, said, that Bank of England Notes are not at present forged by writing

engravers or their apprentices, but by persons at Birmingham, Manchester, and other places, who have probably been long engaged in engraving for the calico printers. With regard to the 15 dollar American Bank Note, which contained many words engraved in very small characters scattered over its surface, he stated, that the engraver of the Bank of England was three months in imitating one-fourth part of it.

Mr. *Lee* was of opinion that it might be *possible* to imitate Mr. Hansard's plan on blocks of wood or brass, cut in relief (inasmuch as he conceives nothing can be done which may not be imitated), but that such immense time and patience would be required as to preclude all probability that it would ever be attempted, and consequently that it is as complete, as it respects forgery, as if it was actually impracticable.

May 8.

A letter from Mr. Bessemer, addressed to Mr. B. Beaumont, states, that the time required to engrave a diamond lower case alphabet and doubles, consisting of 33 punches, would be about 6 weeks; and that the same time would be required for a set of capitals of 28 punches. On which Mr. T. C. Hansard observed in reply, that the number of punches required in Mr. H.'s proposed Bank Note was 157, and therefore, on Mr. Bessemer's own calculation would take 32 weeks to cut. But if an individual were to attempt to complete a fount of letter by himself from first to last, it would occupy him several years.

Mr. *Caslon*, letter-founder, stated, that the punches of the diamond type cast by him were cut by Mr. Bessemer, and that for this fount of type at least 150 punches must have

been cut, as every separate letter and character requires a separate punch. He thinks that it would be scarcely possible for one person to complete a fount of letters from first to last. In the ordinary course of business the mere preparation of the types after the punch cutter has finished his process, goes through the following eight different hands; 1st, the justifier, who strikes the matrices; 2nd, the mould maker; 3rd, the caster; 4th, the breaker off; 5th, the rubber; 6th, the kerner; 7th, the setter up; 8th, the dresser. Two of these are boys; and although the work might no doubt be executed by fewer than eight different hands (this particular number being however adopted as most conducive to expedition and excellence of work); yet that the whole could be gone through by one person he thinks barely and scarcely possible, he has himself never heard of an instance of such having been the case. If only one person was employed in each department, a fount of types could scarcely be completed in 7 or 8 months; at present there are only 4 or 5 persons in England who can execute diamond type, owing no doubt to the limited demand for it; and the peculiar style of each of these punch cutters is perfectly well known to persons conversant with letter founding.

The large type figures in the present Bank of England Notes were cast by Mr. Caslon. The Bank retain the matrices in their own possession, from which they have types cast by Mr. Caslon when they want them.

It would take a person a day to cut two punches of diamond type, and in his opinion Mr. Bessemer could not get ready for the founder a complete fount of diamond type in less than 4 or 5 months; and to get the types from the punches ready for use would occupy 6 or 8 months longer.

May 15.

Mr. *Clymer* of America, whom the Secretary had been ordered on a former night to invite, being present, stated from his own personal knowledge, that the engraving of the ornamental borders of the American Bank Notes is made on thick plates of soft steel, the circular work being put in by the lathe, and the flowers and other ornaments by punches, and the methods commonly practised by the die engravers. After the pattern has been completed the plates are hardened. These plates are then employed, to impress a reverse on rollers of very soft cast steel, by repeatedly passing the plate between the rollers. The rollers are then hardened, and from these the impression is transferred to plates of copper, on which the writing and vignette are afterwards engraved in the usual way. Each plate contains 4 notes. Mr. Clymer stated, that he was one of a company in the United States during the late war, whose object was, to produce Notes as difficult as possible of imitation. For this purpose they formed the borders of impressions from block cutting on brass, and the body of the Note was filled up with type. Some of the Banks adopted their Notes, but peace coming on, the company broke up, after having subsisted only a few months, and the plan was not pushed to any extent; 1, 2, and 3 dollar Notes were all that were made, and these are still in circulation. He has known forgeries to have been committed on those American Banks whose Notes were executed by Murray and Co. where they have been for considerable sums, but not for 1, 2, or 3 dollars. A regular establishment for forging the American Notes was formed in Canada during the war.

December 22.

Mr. Solly's communication was read and taken into consideration.

Mr. *Turrell* expressed his conviction, that the engine-work in Mr. Solly's specimen, cannot be adequately executed by hand, and that it offers as complete a prevention of forgery as can be effected by copper-plate engraving. He is of opinion, however, that type printing offers on the whole the most perfect security.

Mr. *Ramshaw* observed, that the time required for inking a plate is according to the fineness of the work which it contains; and comparing the work of Mr. Solly's specimen with that of the ordinary Bank-Note, is persuaded that the time required for inking the former so as to do justice to it, would be four times that required for the latter.

A doubt having been expressed whether fine work could be taken off on hard or sized paper, Mr. *Restiaux* stated, that he had taken off good impressions of some of Bartolozzi's fine engravings on hard paper; and Mr. Allan exhibited specimens of engraving performed by his engine, taken off on the back of a Bank-Note.

Mr. *Restiaux* stated, with reference to Mr. Solly's proposed press, that in the Bank they print two impressions from one inking; the first impression requires no great bodily exertion, but in order to get off the second, a pasteboard is thrust below the plate, in consequence of which an enormous strain is required. The price paid at present by the Bank for printing, is 7*s.* 6*d.* per ream of 480 double Notes; whereas,

if the plate were inked every time, the cost would be 10*s.* 6*d.*; the difference between these two sums is the saving to the Bank.

In printing coarse work the times of inking and of passing through the press are nearly equal; by saving the latter, therefore, half the workman's time is saved; but in proportion to the fineness of the work is the time required for inking, whereas that for passing through the press is nearly the same for coarse as for fine work. Therefore, as the engraving on the Bank-Note becomes of higher quality, the advantage of Mr. Solly's press, as far as the saving of time is concerned, will be diminished.

Printed by T. C. Hansard, Peterborough-court, Fleet-street, London.

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Report of the committee...preventing the forgery of bank notes...

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